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HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Fort Collins, CO 80527-2400

EXAMINER	
CHU, KIM KWOK	
ART UNIT	PAPER NUMBER
2653	

DATE MAILED: 01/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/783,008	GIBSON, GARY A.	
	Examiner	Art Unit	
	Kim-Kwok CHU	2653	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *Amendment filed on 9/30/2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5-17,19 and 21-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3, 5-17,19 and 21-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 February 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *7/27/2004*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

Response to Remarks

1. Applicant's Remarks filed on September 30, 2004 have been fully considered.

(a) Applicant does not agree that the prior art of Manalis teaches an energy emitting tip (page 6 of the Remarks, lines 11-15). Applicant states that a tip (prior art of Manalis' tip 115 as illustrated in Fig. 2) for applying voltage is different from an energy-emitting tip. Accordingly, both Applicant and Manalis teach an AFM type tip/probe where energy/current is emitted. In order to generate energy by using electrical current, a power source such as Manalis's voltage source is required on Manalis' tip 115. Similarly, Applicant uses a power source 110 applied to the AFM tip 20 as illustrated in Fig. 3.

Applicant states that energy generated by fire and chemical reactions does not need a voltage source (page 6 of the Remarks, lines 18-20). Accordingly, Applicant's invention is about an AFM which inherently requires a voltage/power source to generate energy such as a current beam.

(b) Applicant does not agree that the prior art of Manalis teaches a fluid layer (page 6 of the Remarks, last paragraph). Accordingly, Manalis teaches "the tip 115 contacts substrate S (actually, a thin layer of fluid adsorbed thereon)" on column 2, lines 41-43 and lines 55 and 56). Although the word "adsorbed" in the last Office Action is misspelled as "absorbed", it is

clear that the original text of Manalis's implies that a thin layer of fluid is attained/held on the substrate similar to Applicant's fluid 90 in Fig. 3.

(c) Applicant states that his fluid medium is clearly taught, for example, "particles of metallic material within the fluid medium" (page 7 of the Remarks, last 7 to 5 lines). Accordingly, the above feature is not defined in claims 1-17, 19, 21, and 22.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

> *A person shall be entitled to a patent unless --*
> *(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.*

3. Claims 9, 10, 12 and 14 are rejected under 35 U.S.C. § 102(e) as being anticipated by Manalis et al. (U.S. Patent 6,519,221).

Manalis teaches an optical disk having all of the elements and means as recited in claims 9, 10 and 14. For example, Manalis teaches the following:

(a) as in claim 9, a data-storage device (Fig. 1);

(b) as in claim 9, a storage medium S (Fig. 1);

(c) as in claim 9, nanometer-scaled data storage areas in the storage medium (Fig. 1; column 1, lines 66 and 67; column 3, lines 38 and 39);

(d) as in claim 9, an energy-emitting tip 115 positioned in close proximity to the storage medium (Fig. 1; AFM type tip emits energy such as current);

(e) as in claim 9, molecules positioned between the energy-emitting tip 115 and the storage medium S wherein the molecules are at least partially immersed in a fluid medium (Fig. 1; column 2, lines 42 and 43; the fluid layer is particles/molecules in a liquid form);

(f) as in claim 10, the energy-emitting tip emits electrons (Fig. 1; AFM where its tip emits electrons to oxidize the medium's surface);

(g) as in claim 12, each of the molecules comprises a one-dimensional molecules (the molecules are arranged in a line); and

(h) as in claim 14, the molecules comprise conductive molecules (the fluid layer is conductive so that indents can be formed and read electrically).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> *(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.*

5. Claims 1, 2, 7, 8, 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Manalis et al. (U.S. Patent 6,519,221) in view of Greiner et al. (U.S. Patent 4,497,007).

Manalis teaches a data storage device very similar to that of the instant invention. For example, Manalis teaches the following:

(a) as in claim 1, a data-storage device (Fig. 1);

(b) as in claim 1, a storage medium S (Fig. 1);

(c) as in claim 1, nanometer-scaled data storage areas in the storage medium (Fig. 1; column 1, lines 66 and 67; column 3, lines 38 and 39);

(d) as in claim 1, an energy-emitting tip 115 positioned in close proximity to the storage medium (Fig. 1);

(e) as in claim 1, a fluid medium positioned between the energy-emitting tip 115 and the storage medium S (Fig. 1; column 2, lines 42 and 43);

(f) as in claim 1, particles contained in the fluid medium (Fig. 1; fluid consist fluid particles in a liquid form);

(g) as in claim 2, the energy-emitting tip emits electrons (Fig. 1; AFM where its tip emits electrons to oxidize the medium's surface); and

(h) as in claim 8, the particles form a bridge between the tip and the storage medium (Fig. 1; fluid is an interface between the tip and the medium).

However, Manalis does not teach the following:

(a) as in claim 1, the fluid medium comprises a ferrofluid; and

(b) as in claim 7, the particles comprise a magnetic material.

Greiner teaches a nanometer-scale/near-field data storage process having the following:

(a) a ferro-fluid suspension layer (Fig. 1; column 10, lines 22-26); and

(b) the ferro-fluid having a magnetic material (Fig. 1; column 10, lines 22-26).

A data storage system using a scanning probe in a nanometer scale requires its data be correctly read without moving the probe too close or too far away from the medium. For example, Greiner uses a ferro-fluid magnetic layer to enhance the data detection due to the scanning distance between the head and the information carrier. Similarly, although Manalis does not specify what is the fluid layer between the tip 115 and the substrate S, it would have been obvious to one of ordinary skill in the art to use a ferro-fluid layer such as Greiner 's as Manalis's thin fluid layer, because the ferro-fluid layer is a magnetic layer which improves the scanning sensitivity of Manalis's tip movement in a z-axis by immersing the scanned surface with a magnetic path.

6. Claim 21 has limitations similar to those treated in the above rejection, and is met by the references as discussed above.

7. Method claim 22 is drawn to the method of using the corresponding apparatus claimed in claim 1. Therefore method claim 22 corresponds to apparatus claim 1 and is rejected for the same reason of obviousness as used above.

8. Claims 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Manalis et al. (U.S. Patent 6,519,221) in view of Greiner et al. (U.S. Patent 4,497,007) and Durig et al. (U.S. Patent 6,084,849).

Manalis in view of Greiner teach a data storage device very similar to that of the instant invention. However, both Manalis and Greiner do not teach the following:

(a) as in claim 3, the energy-emitting tip emits thermal energy.

Durig teaches a storage medium where an emitting tip emits heat energy (Figs 3A-3C; column 2, lines 25-42).

To cause a bump as a data bit on a storage medium by using an AFM, either an electrons emitting probe such as Manalis's or a heat emitting probe such as Durig's can be used. Hence, for providing energy to the tip of the AFM, it would have been obvious to one of ordinary skill in the art at the time of invention to choose either electron energy or heat energy, because both electron and heat are commonly used to make an indent on the surface of the storage medium.

9. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Manalis et al. (U.S. Patent 6,519,221) in view of Greiner et al. (U.S. Patent 4,497,007) and Cleveland et al. (U.S. Patent 5,925,818).

Manalis in view of Greiner teach a data storage device very similar to that of the instant invention. However, both Manalis and Greiner do not teach the following:

(a) as in claims 5 and 6, the fluid comprised a high dielectric fluid/material.

Cleveland teaches an AFM where:

(a) a layer of dielectric fluid is used (column 14, lines 3-14; dielectric material contain conductive molecules because it is not an absolute insulating material).

To improve the AFM's performance such as decrease the detection error, a non-conducing spacer may be located between Manalis's energy emitting tip and the storage medium. Hence, it would have been obvious to one of ordinary skill in the art to use a high dielectric fluid such as Cleveland's, because the high dielectric fluid can prevent ionized air which causes phenomena such as the variation of the relative capacitance between the tip and the storage medium.

10. Claim 11 rejected under 35 U.S.C. 103(a) as being unpatentable over Manalis et al. (U.S. Patent 6,519,221) in view of Durig et al. (U.S. Patent 6,084,849).

Manalis teaches a data storage device very similar to that of the instant invention. However, Manalis does not teach the following:

(a) as in claim 11, the energy-emitting tip emits thermal energy.

Durig teaches a storage medium where an emitting tip emits heat energy (Figs 3A-3C; column 2, lines 25-42).

To cause a bump as a data bit on a storage medium by using an AFM, either an electrons emitting probe such as Manalis's or a heat emitting probe such as Durig's can be used. Hence, for providing energy to the tip of the AFM, it would have been obvious to one of ordinary skill in the art at the time of invention to choose either electron energy or heat energy, because both electron and heat are commonly used to make an indent on the surface of the storage medium.

11. Claims 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Manalis et al. (U.S. Patent 6,519,221) in view of Schaffer et al. (U.S. Patent 6,391,217).

Manalis teaches a data storage device very similar to that of the instant invention. However, Manalis does not teach the following:

(a) as in claim 13, the conductor molecules comprise polymers.

Schaffer teaches an AFM having a liquified conductive layer 110 made of dielectric polymer (Fig. 4b; column 4, lines 37-48).

For a conductive material act as a fluid, it would have been obvious to one of ordinary skill in the art to use Schaffer's dielectric polymer as Manalis's fluid, because the dielectric polymer is a liquefied conductive material.

12. Claims 15, 16, 17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Manalis et al. (U.S. Patent 6,519,221) in view of Greiner et al. (U.S. Patent 4,497,007).

Manalis teaches a data storage method very similar to that of the instant invention. For example, Manalis teaches the following steps:

(a) as in claim 15, providing a storage medium S comprising nanometer-scale data storage area (Fig. 1; column 1, lines 66 and 67; column 3, lines 38 and 39);

(b) as in claim 15, positioning an energy-emitting tip 115 in close proximity to the storage medium (Fig. 1);

(c) as in claim 15, guiding energy emitted from the energy-emitting tip to the storage area (Fig. 1);

(d) as in claim 15, the guiding step comprises channeling the energy-emitted through particle in a fluid medium between the storage medium and the energy-emitting tip (Fig. 1; column 4, lines 59-62);

(e) as in claim 15, altering a state of the storage areas with the emitted, guided step (Fig. 1; the altering state is the oxidation process);

(f) as in claim 16, the guiding step comprises channeling the energy emitted through molecules positioned between the storage medium and the energy-emitting tip (Fig. 1; column 4, lines 59-62; oxidation process is through the fluid layer);

(g) as in claim 17, the molecules in the fluid medium comprises one-dimensional molecules (the fluid layer having molecules formed in one-dimension); and

(h) as in claim 19, the guiding step comprises using particles that form a bridge between the storage medium and the energy-emitting tip (Fig. 1; fluid is an interface between the tip and the medium).

However, Manalis does not teach the following steps;

(a) as in claim 15, the fluid medium is a ferrofluid; and

(b) as in claim 17, the fluid medium is conductive.

Greiner teaches a nanometer-scale/near-field data storage having the following feature:

(a) the fluid medium is a ferro-fluid(Fig. 1; column 10, lines 22-26); and

(b) as in claim 17, the fluid medium is conductive (Fig. 1; ferro-fluid is conductive).

A data storage system using a scanning probe in a nanometer scale requires its data be correctly read without moving the probe too close or too far away from the medium. For example, Greiner uses a ferro-fluid magnetic layer to enhance the data detection due to the scanning distance between the head and the information carrier. Similarly, although Manalis does not specify what is the fluid layer between the tip 115 and the substrate S, it would have been obvious to one of ordinary skill

in the art to use a ferro-fluid layer such as Greiner 's as Manalis's thin fluid layer, because the ferro-fluid layer is a magnetic layer which improves the scanning sensitivity of Manalis's tip movement in a z-axis by immersing the scanned surface with a conductive path.

13. Claims 23-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Manalis et al. (U.S. Patent 6,519,221) in view of Greiner et al. (U.S. Patent 4,497,007).

Manalis teaches a data storage device very similar to that of the instant invention. For example, Manalis teaches the following:

(a) as in claim 23, a data storage medium having a material property that is capable of changing a memory state under the influence of a directed beam of energy nanometer-scaled data storage areas in the storage medium (Fig. 1; column 1, lines 66 and 67; column 3, lines 38 and 39);

(b) as in claim 23, at least one tip in close proximity to the storage medium, the tip configured to emit a directed high-power-density beam towards the data storage medium when the tip is in an energy emitting state (Fig. 1; AFM inherently emits a directed high power-density energy (Fig. 1);

(c) as in claim 23, a fluid medium positioned between the tip and the storage medium (Fig. 1; column 2, lines 42 and 43); and

(d) as in claim 27, the high-power-density beam emitted is an electron beam (Fig. 1; power source generates an electron beam).

However, Manalis does not teach the following:

(a) as in claim 23, the fluid medium dispersed particles of metallic material within the fluid medium;

(b) as in claim 23, the dispersed particles having sufficient tolerances permitting alignment between the tip and storage medium along the directed high-power-density beam when the tip is in the energy emitting state to form a temporary wire-like column, the wire-like column facilitating the transfer of applied energy to change the memory state in a manner complementary to the material property;

(c) as in claim 24, the wire-like column serves as a temporary conductor between the tip and the storage medium;

(d) as in claim 25, the metallic material particles are magnetic material particles;

(e) as in claim 26, the conductive particles do not adhere to the storage medium; and

(f) as in claim 28, the fluid medium is substantially dielectric in a relaxed state and locally conductive in an

excited state, the aligned magnetic particles in along the directed high-power-density beam establishing the excited state.

Greiner teaches a nanometer-scale/near-field data storage process having the following:

(a) a fluid medium dispersed particles 17 of metallic material within the fluid medium (Fig. 1; the metallic material is magnetic; column 4, lines 29-35; column 10, lines 22-26);

(b) the dispersed particles 17 (magnetic particles) having sufficient tolerances permitting alignment between the tip and storage medium along the directed high-power-density beam when the tip is in the energy emitting state to form a temporary wire-like column, the wire-like column facilitating the transfer of applied energy to change the memory state in a manner complementary to the material property (Fig. 1; temporary alignment of wire like column to transfer applied energy such as current is an inherent physical property of a magnetic fluid; column 10, lines 22-26);

(c) the wire-like column serves as a temporary conductor between the tip and the storage medium (Fig. 1; column 4, lines 29-35; column 10, lines 22-26);

(d) the metallic material particles are magnetic material particles (Fig. 1; column 4, lines 29-35; column 10, lines 22-26);

(e) the conductive particles do not adhere/stick to the storage medium (Fig. 1; magnetic particles are in a fluid form which do not adhere to the storage medium; column 4, lines 29-35; column 10, lines 22-26); and

(f) the fluid medium 17 is substantially dielectric in a relaxed state and locally conductive in an excited/magnetized state, the aligned magnetic particles in along the directed high-power-density beam establishing the excited state (Fig. 1; ferro-fluid is a non-conductive material when it is not being magnetized/aligned).

A data storage system using a scanning probe in a nanometer scale requires its data be correctly read without moving the probe too close or too far away from the medium. For example, Greiner uses a ferro-fluid magnetic layer to enhance the data detection due to the scanning distance between the head and the information carrier. Similarly, although Manalis does not specify what is the fluid layer between the tip 115 and the substrate S, it would have been obvious to one of ordinary skill in the art to use a ferro-fluid layer such as Greiner 's as Manalis's thin fluid layer, because the ferro-fluid layer is a magnetic layer which improves the scanning sensitivity of Manalis's tip movement in a z-axis by immersing the scanned surface with a magnetic path.

14. Method claims 29-31 are drawn to the method of using the corresponding apparatus claimed in claims 23-25. Therefore method claims 29-31 correspond to apparatus claims 23-25 and are rejected for the same reasons of obviousness as used above.

Prior Art

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Lindsay (5,621,210) is pertinent because Lindsay teaches an AFM probe works under a conducing fluid.

Hansma et al. (5,581,082) is pertinent because Hansma teaches an AFM which holds fluid to reduce forces applied to the sample by the cantilever.

16. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action

17. Any response to this action should be mailed to:

Commissioner of Patents and Trademarks Washington, D.C. 20231 Or faxed to:

(703) 872-9306 (for formal communications intended for entry. Or:

(703) 746-6909, (for informal or draft communications, please label "PROPOSED" or "DRAFT")

Hand-delivered responses should be brought to Crystal Park II, 2021 Crystal Drive, Arlington. VA., Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-4700.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kim CHU whose telephone number is (703) 305-3032 between 9:30 am to 6:00 pm, Monday to Friday.

K 1/18/05

Kim-Kwok CHU
Examiner AU2653
January 18, 2005

(703) 305-3032

William Korzuch
WILLIAM KORZUCH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600